Effects of teamwork climate on cooperation in cross-functional temporary multi-organization workgroups

Aaron M. Anvuur, Ph.D.[1]; and Mohan M. Kumaraswamy, Ph.D., M.ASCE[2]

Abstract

In this study, the formative roles of common goals, equal status, integrative interactions, and authority support as the optimal factors for engendering individuals' cooperation with their proximal cross-functional project workgroups are examined. The four factors are properties of the workgroup environment, and have each been highlighted as being important in previous conceptual and critical success factors (CSFs) studies of project effectiveness. However, until now, there has been no systematic empirical test of the interactive effects of all four factors in a construction temporary-multi-organization (TMO) workgroup setting. The four factors are conceptualized in this study as the reflective dimensions of a superordinate multidimensional latent construct, teamwork climate. An integrative test was undertaken of the construct validity of this multidimensional construct, its substantive utility relative to its dimensions, and of specific hypotheses connecting the multidimensional construct and its dimensions to individual's in-role, extra-role, compliance, and deference behaviour; the test was performed using two cross-cultural samples of built environment professional managers (UK, $N = 381$; and Hong Kong, $N = 140$) and structural equation modelling. The

[1] Senior Lecturer, School of Civil and Building Engineering, Loughborough University, Ashby Road, Loughborough, LE11 3TU, UK (corresponding author). ORCID ID: 0000-0002-6863-2018. Email: A.M.Anvuur@lboro.ac.uk

[2] Honorary Professor, Department of Civil Engineering, The University of Hong Kong, Pokfulam Rd., Hong Kong. ORCID ID: 0000-0003-1127-5141. E-mail: mohan@hku.hk

results showed convergence in support of the multidimensional conceptualization of teamwork climate, and also show that teamwork climate significantly and positively influences workgroup members' in-role, extra-role, compliance, and deference behavior. These findings provide compelling indication that teamwork climate is an important and efficient determinant of cooperative behavior within TMO contexts and, in so doing, make an important contribution to the extant and construction engineering and management lines of literature on work climates. This study also makes an important contribution to the debate in the extant literature about how to model the four climate dimensions, in so far as it shows that a superordinate multidimensional conceptualization maximizes predictive utility, theoretical parsimony and bandwidth. Finally, this study makes an important contribution to practice, as it focuses project managers' attention on creating the generative project environments for the four optimal conditions for teamwork.

Keywords: Alignment, Cooperation, Cross-Functional Workgroup, Teamwork Climate, Temporary Multi-Organization (TMO).

Introduction

Construction projects are complex adaptive systems involving many differentiated yet complementary functional specialisms that tend to be *across*—rather than within—firms and have high interdependencies in inputs, processes and outcomes (Hobday, 1998). Workgroup members in such temporary multi-organizations (TMOs) as coalitions are, thus, boundary spanners. The managerial imperative for joint-production in construction TMOs becomes, essentially, one of cross-functional integration (Lawrence and Lorsch, 1967). This shift in emphasis from (the management of) task execution (*taskwork*) and towards issues of coordination and cooperation (*teamwork*) is an enduring challenge for construction projects. Teamwork has been defined conceptually as "a set of interrelated cognitions, attitudes, and behaviors contributing to the dynamic processes of

41 performance" (Salas *et al.*, 2008:541). Performance here refers to the actual activity engaged in (the
42 behaviour) that advances the goals of the social collective – *not* an appraisal of the outcomes of that
43 activity, which is effectiveness (Dulaimi and Langford, 1999; Salas *et al.*, 2008). The question of how to
44 foster effective teamwork in joint-production environments has attracted, and continues to attract, a
45 lot of attention from researchers. One of the key discoveries of previous research in this area is that
46 favourable (shared) cognitions about the work environment and its expected behaviour can promote
47 effective teamwork and cooperation (DeChurch and Mesmer-Magnus, 2010; Mohammed *et al.*, 2010).
48 Previous research also highlights the crucial role of training, coaching and facilitation (i.e.
49 teambuilding activities) in creating and sustaining favourable group cognitions (Salas *et al.*, 2008).
50 In the context of construction projects, efforts at promoting effective teamwork mainly take the
51 form of interventions for socialization, and focus on the creation of conducive work environments.
52 Such efforts are broadly represented by the partnering ethos (Anvuur and Kumaraswamy, 2007).
53 Based on an extensive analysis and synthesis of the extant literature, Anvuur and Kumaraswamy
54 (2007) developed a conceptual model for partnering and alliancing. The model emphasizes the
55 formative role of four factors in promoting effective teamwork in TMO workgroups: common goals,
56 equal status, integrative interactions, and authority support. The four factors (explained later) are
57 properties of the TMO workgroup environment. They are distinct yet highly interrelated and
58 mutually reinforcing concepts; thereby representing a superordinate multidimensional latent
59 construct (Law *et al.*, 1998), referred to this study as *teamwork climate*. Our labeling of this
60 superordinate multidimensional construct as teamwork climate is consistent with the enduring
61 definition of climate as perceptions of the policies, practices and procedures that a social collective
62 rewards, supports, and expects (cf. Schneider and Reichers, 1983; Kuenzi and Schminke, 2009). We
63 focus here on TMO workgroup members' individual perceptions of their workgroup environment –

i.e. *psychological climate* – rather than their shared perceptions of the TMO workgroup environment (i.e. workgroup climate), not least because the latter ultimately emanates from the former (cf. Schneider and Reichers, 1983; Mathisen *et al.*, 2006; Kuenzi and Schminke, 2009). Thus, with this definition of climate, a distinction is drawn between teamwork climate and with culture, which pertains to deep-seated and enduring manifestations of the worldview and values of a social collective, usually through its forms (e.g. artifacts, legends and symbols) (Fellows and Liu, 2013; Schneider *et al.*, 2013). Indeed, in the context of TMO project settings, it has been argued that application of the notion 'project culture' to most projects (except perhaps some mega-projects) is misleading (Fellows and Liu, 2013: 4).

The notion that the workgroup environment influences teamwork in construction TMO settings is not new. Indeed, the importance of the TMO workgroup environment has been highlighted in numerous conceptual and critical success factors (CSFs) studies of project effectiveness (cf. Anvuur and Kumaraswamy, 2007). Construction management research studies have also reported significant teamwork consequences of one or another of the teamwork climate dimensions (e.g. Brookes *et al.*, 2006; Tuuli and Rowlinson, 2009). However, there is as yet no systematic empirical test of the interactive effects of all four teamwork climate dimensions in a construction TMO workgroup setting. The purpose of this paper is to redress this by empirically testing the effects of the multidimensional teamwork climate construct on the cooperation of project actors with their TMO workgroups. If support were to be found for the hypotheses put forth in this paper linking teamwork climate to individuals' cooperation, this would also constitute a needful and substantive validation of the conceptual framework developed by Anvuur and Kumaraswamy (2007). In the sections that follow, a brief description of the conceptual model developed by Anvuur and Kumaraswamy (2007) is presented, along with the study hypotheses. Next, the data collection and analysis methods are

87 described. We then present the results of the data analyses and discuss the implications of our
88 findings for research and practice.

89 Conceptual model

90 The framework developed by Anvuur and Kumaraswamy (2007) is as shown in Fig. 1, except
91 for clarity and consistency in terminology, "cooperative interactions" has been replaced with
92 "integrative interactions". The dominant construction industry conditions that were the original
93 drivers for the partnering motif and still persist to this date, are depicted in the left-hand column of
94 Fig. 1. The four teamwork climate dimensions in column 3 (third from left) are *process benefits* from the
95 implementation of the key components of partnering in column 2. The first teamwork climate
96 dimension, equal status, underscores the presence of a workgroup environment characterized by
97 mutual professional respect for members' work inputs. The second dimension, integrative
98 interactions, reflects the extent to which workgroup interactions are inclusive, constructive and take
99 place in a positive and non-threatening environment. The third dimension of the teamwork climate
100 construct, common goals, underscores the presence and salience of a normative goal frame that
101 motivates workgroup members to enact such behaviors as are necessary to advance the goals of the
102 workgroup. The final dimension, authority support, underscores the presence and abundance of
103 senior management support for collaborative working; this implies both articulated support (e.g. in a
104 project charter and use of underlying contracts – or relevant amendments to conditions of contract –
105 that are supportive of the development of relational norms) and enacted support (e.g. budget
106 allocation and authority to 'do deals' independent of direct functional interference). These teamwork
107 climate dimensions, acting in concert, lead to the *content benefits* of partnering (e.g. cooperation, project
108 effectiveness, innovation) in the right-hand column of Fig. 1. Note also that many other cognitive and
109 affective processes mediate the effects of the content benefits (e.g. interpersonal trust, positive affect,

group identification). Thus, teamwork climate is conceptualized here to be associated with global individual, collective and project level outcomes.

The four teamwork climate dimensions are interrelated and reinforcing; they are conceptualized as reflective dimensions of a superordinate multidimensional (teamwork climate) construct. For example, authority support, when present, helps to stabilize the normative goal (i.e. common goal) frame in workgroup members through "goal contagion" effects and when absent, can create subversive undercurrents to any shared cognition developed by workgroup members (Lindenberg and Foss, 2011). Integrative interactions, when experienced by individuals in workgroup settings, create feelings of professional respect, self-worth and equal status to significant others. A detailed explication of the theoretical antecedents of the four teamwork climate dimensions and their conceptual and practical relevance to construction TMOs is provided in Anvuur and Kumaraswamy (2007); however, a brief description is presented below.

The four teamwork climate dimensions were proposed by Allport (1954) in what is known as the "contact hypothesis", as the optimal conditions for reducing prejudice in intergroup interactions. Allport's (1954) formulation of the contact hypothesis formed the foundations of a strong and established research tradition on intergroup contact theory, involving field, experimental, archival, and survey research (Pettigrew, 1998). Early research on the contact hypothesis focused mainly on racial and ethnic targets while later research extended the focus to also include a diverse range of targets like the elderly, disabled people, and employees of companies that have undergone a merger or acquisition (cf. Gaertner and Dovidio, 2000). Pettigrew and Tropp (2006) performed a meta-analytic test of intergroup contact theory using 713 independent samples from 515 studies. Their findings show that, rather than being essential for intergroup interactions to take place, Allport's four conditions facilitate the achievement of positive outcomes in intergroup interactions. Their results also

show that contact effects generalize to the entire outgroup and across contact settings. Pettigrew and Tropp (2006) concluded that intergroup contact theory should be extended to other groups as well, as a general social psychology theory. Further, upon closer examination of their results, Pettigrew and Tropp (2006) concluded that the four optimal conditions are "best conceptualized as an interrelated bundle rather than as independent factors" (p.751).

Within the work climate literature, West (1990; West and Anderson, 1996) proposed a climate for workgroup innovation model consisting of four factors, similar to the contact factors: clarity of and commitment to objectives ('vision'); participation; task orientation; and support for innovation. West and Anderson's (1996) task orientation factor is based on Tjosvold *et al*.'s (1986: 127) notion of constructive controversy: frank and open-minded exploration of all views on a group decision problem, and their integration into high quality final solutions. Anderson and West (1998) developed and validated the climate for workgroup innovation model in the Team Climate Inventory (TCI). Anderson and West (1998) compared two models of the TCI: a four-factor correlated model comprising the original four factors, as stated above; and a five-factor correlated model in which participation was replaced with two factors – participative safety, and interaction frequency. Participative safety implies an inclusive and interpersonally safe workgroup environment, while interaction frequency is self-explanatory. Anderson and West (1998) found that both the four- and five-factor TCI models fit the data well, with negligible differences in fit between them. Anderson and West (1998) finally settled for the five-factor TCI model to maximize predictive utility, and called for future research to confirm the dimensionality of the TCI. Further, they noted that (West and Anderson, 1996; Anderson and West, 1998): a single factor may underlie the TCI factors, but argued they are best conceptualized as a correlated set; and that the TCI factors are likely to be useful in predicting other facet-specific workgroup climates. A recent systematic review and critique of the

156 organizational climate literature by Kuenzi and Schminke (2009) showed that facet-specific work
157 climates can – and do – have effects beyond their immediate facet-specific outcomes. Studies
158 examining the dimensionality of the TCI have found support for both four- and five-factor TCI
159 models, and at both individual and workgroup levels of analysis (e.g. Mathisen *et al.*, 2004; Mathisen
160 *et al.*, 2006). Mathisen *et al*. (2006: 32) also found that a second-order one-factor TCI model "showed
161 almost comparable fit at both individual and team levels to the first-order four-factor model".
162 Therefore, they concluded that a multidimensional latent variable approach to work climate might
163 hold much promise. However, it is argued that interaction frequency *per se*, as a separate climate
164 dimension, is conceptually redundant since frequent interaction is an *inherent* characteristic of the
165 proximal workgroup in joint-production contexts (cf. Anderson and West, 1998: 236; Lindenberg and
166 Foss, 2011).
167 Carson *et al*. (2007) studied the effects of the 'internal team environment' and 'external
168 coaching' on shared leadership and team performance. They conceptualized 'internal team
169 environment' as a superordinate multidimensional construct with 'shared purpose', 'social support',
170 and 'voice' as its first-order reflective dimensions. Carson *et al*.'s (2007: 1222) shared purpose, defined
171 as similar understandings of and focus on collective goals, is conceptually equivalent to common
172 goals in the present study. Carson *et al*. (2007: 1222) defined social support as "team members' efforts
173 to provide emotional and psychological strength to one another" and voice, as "the degree to which a
174 team's members have an input into how the team carries out its purpose". Thus, social support and
175 voice are subsumed under the integrative interactions dimension in the present study. Carson *et al*.'s
176 (2007) conceptualization of internal team environment does not, therefore, include equal status and
177 authority support, both important formative facets of the workgroup environment.

Previous research, thus, provides broad support for the multidimensional conceptualization of teamwork climate construct, with global individual- and group-level outcomes (see Fig. 1). As the review by Anvuur and Kumaraswamy (2007) shows, the teamwork climate dimensions are also germane to the joint-production context of construction TMO workgroups, and have each been identified as having formative roles in the parallel lines of extant on teams, teamwork and team performance. However, in the lines of extant literature, there is a paucity of studies that include the common goals, equal status, integrative interactions, and authority support in multidimensional construct designs, and with individuals' cooperation as an outcome. Within the CMR literature, there is, to the best of the authors' knowledge, no multidimensional study of the teamwork climate factors. The present paper responds to this need by empirically testing hypotheses linking the multidimensional teamwork climate construct to individuals' cooperation with their TMO workgroups. The present study also constitutes useful validation of the conceptual framework in Fig. 1, as recommended by Anvuur and Kumaraswamy (2007), and in so doing provides greater confidence in its substantive utility and deployment. The individual level of analysis is adopted in this paper. Cooperation is conceptualized as individuals' performance behaviors that advance the goals of their proximal workgroups, and has four dimensions in terms of whether and to what extent role-incumbents (Tyler and Blader, 2001): creditably perform their work roles (*in-role behavior*); go the extra mile and undertake extra task activities or help colleagues with their work-related problems (*extra-role behavior*), adhere comprehensively to work-related rules and procedures (*compliance behavior*), and defer to relevant authorities or 'best practice' standards of appropriate conduct where rules or norms are non-existent or vague (*deference behavior*). The four performance behaviors are context-specific and constitute distinct, yet interrelated manifestations of the cooperation of individuals' with their workgroups. The construct validity and substantive utility of this four-dimensional conceptualization

of cooperation in construction has been established in previous studies (e.g. Anvuur and Kumaraswamy, 2012; Anvuur *et al.*, 2012).

…….

Fig. 1 about here

…….

Hypotheses

Hypotheses connecting climates to individuals' cooperation were already tenable in the extant literature before the present study. For example, within the extant literature, justice climate (e.g. Naumann and Bennett, 2000; Liao and Rupp, 2005; Walumbwa *et al.*, 2008) and involvement climate (e.g. Richardson and Vandenberg, 2005) have been shown to predict individuals' extra-role behaviors. Within project contexts, Thamhain (2004) found that the project team environment positively influenced team performance in the 76 technology-based project teams he studied. Thamhain (2004) operationalized project team environment as including factors such as professional recognition, respect and senior management support; these factors are reflected in the equal status and authority support dimensions of the teamwork climate construct in the present study. In their study of the social network basis of knowledge management in project contexts, Brookes *et al*. (2006) found that professional respect was significantly correlated with the effective sharing of information and knowledge among workgroup members, what they termed relationship "conductivity". Using a survey sample of 380 built environment managers nested in 115 construction teams, Tuuli and Rowlinson (2009) examined the multi-level effects of empowerment climate on individuals' in-role and extra-role behaviors. They conceptualized empowerment climate as reflecting the structural properties of the work environment, including access to information, resources, support, and power

and an opportunity to thrive. Their conceptualization of empowerment climate is, thus, consistent with the conceptualization of authority support in the present study. Tuuli and Rowlinson (2009) found that empowerment climate significantly and positively influenced individuals' in-role and extra-role behaviors, both directly and indirectly (through psychological empowerment). Thus, on the basis of previous research, and consistent our conceptual model, teamwork climate is expected to influence all four dimensions of an individual's cooperation with the workgroup; more formerly, we hypothesize thus:

Teamwork climate will significantly and positively influence TMO workgroup members' in-role (H_1), *extra-role* (H_2), *compliance* (H_3), *and deference behaviour* (H_4).

Further, this research seeks to inform this debate in the extant literature about whether the teamwork climate construct is best represented by its dimensions as a set or as a multidimensional construct. As noted earlier, Pettigrew and Tropp's (2006) meta-analytic study concluded that the four teamwork climate dimensions—common goals, equal status, integrative interactions, and authority support—are best conceptualized as an "interrelated bundle", with authority support being "may be an especially important for facilitating positive contact effects" (p.766). West (1996; 1998) concluded that the four factors are best conceptualized as a correlated set, and also suggested a primary role for authority support. In contrast, Carson *et al*. (2007; also see Daspit *et al*., 2013) modeled, and found support for 'internal team environment' as a superordinate construct, although that construct tapped only two dimensions of climate: common goals (i.e. 'shared purpose') and integrative interactions (i.e. 'social support' and 'voice'). This stalemate about how to model the teamwork climate construct reflects a rift between maximizing predictive utility (i.e. using a multivariate structural model), and

providing theoretical parsimony and bandwidth (i.e. using a superordinate or aggregate model) (Law *et al.*, 1998; Edwards, 2001). The lack of consensus on the conceptualization of the teamwork climate dimension also reflects a broader debate in the literature about the utility of multidimensional constructs relative to their dimensions. Edwards (2001) concluded that, although the available evidence to date is stacked against their use, questions about the substantive utility of multidimensional constructs in organizational behavior research can—and should—be examined empirically; we do so in this study for the teamwork climate construct, using the integrative analytical framework proposed by Edwards (2001) and two cross-cultural samples, one from the UK (N = 381; hereafter Study 1) and the other from Hong Kong (N = 140; hereafter, Study 2). The methods of research used in Studies 1 and 2 are discussed in the following section.

…….

Fig. 2 about here

…….

Method

Sample and procedure

Study 1

The questionnaire responses analyzed in Study 1 were from 381 chartered built environment professional managers in the UK. Average age of the participants was 50 years. Average total experience of the participants in construction was 30 years and average experience in current position was 11 years. All participants held managerial positions in the projects on which they reported, and all but 55 of them had at least a bachelor's degree. The sample consisted of 362 Caucasians, 8 Asians, 8 Africans and 3 participants of other ethnicities. This sample included 366 men and 15 women. The

proportion of women managers in the sample (about 4%) compares reasonable well with the total proportion of women employed in the UK construction sector (about 10%, see Worrall *et al.*, 2010).

Items for this Study 1 were merged into a larger questionnaire instrument that was itself a conceptual replication of an earlier Hong Kong based study (see Anvuur, 2008). A focus group discussion involving senior academic colleagues was used to make further refinements to the broader questionnaire instrument to make it more appropriate to the UK context. The final questionnaire instrument was entitled "Research Study into Impact of Professional Relations on Performance in Projects" to reflect the broader aims of the study. Data collection for study 1 was undertaken between July and September 2010.

The aim was to survey built environment professional managers in the UK who have recent project experience. As the theoretical population was unknown, a study population was defined using the following sampling procedure: First, the accessible population was defined as UK-based chartered (i.e. with 'Member' or 'Fellow' designation) built environment professional managers with project management expertise. Second, we searched the accessible professional membership directories such as the Chartered Institute of Building, and the Royal Institution of Chartered Surveyors, for chartered professionals with project management as a specialism, and who also have full postal or email addresses. This resulted in a sampling frame of 4290 professionals. We randomly selected 2000 professionals and invited them to participate in the study. Third, in order to identify and include only those with recent project experience, we asked respondents to indicate if they were directly involved in a construction project that was completed between 2005 and 2010 or currently ongoing but relatively advanced (yes/no). Respondents who answered 'yes' to the screening question (hereafter the 'eligibles') were asked to respond to the whole questionnaire. Those who answered 'no' (hereafter the 'non-eligibles') were directed, via a skip routine, to answer only demographic and social

preference questions. The questionnaire items (save socio-demographic items) were tailored to a project context by expressly asking respondents to focus on their proximal TMO workgroup within one and the same specific project.

The postal questionnaire was printed as an A5 booklet and mailed to potential respondents together with an enclosed business-reply envelope and a cover letter that detailed the particulars of the research study (i.e., researchers involved; purpose of study; nature of and how to the answer questions; importance and voluntary nature of participation; need for accuracy and assurances of confidentiality; data protection notice; approximate time to complete the survey; the aggregate nature of the ensuing data analyses and reporting; and when and how to return the completed questionnaire booklet). Some four hundred and forty-one (441) of those invited to participate in the study had email addresses, and were sent a link to a web version of the questionnaire developed in Opinio software; this granted customized content and anonymity to respondents. After two mailings (for the postal questionnaire) and two email reminders (for the web version), the following results were received: 405 'eligible' responses; 49 'non-eligible' responses; and 97 returned questionnaires. This represents a response rate of 21%, or the higher rate of 23% when 'non-eligibles' in the sampling frame are adjusted for. As not all undelivered postal mails are returned, this response rate is a conservative estimate, and compares reasonably well with those reported for similar UK studies. For example, Ankrah *et al*. (2009) received a response rate of 15% to their questionnaire survey; Bryde (2008) received a response rate of 12%; and Li *et al*. (2005) received a response rate of 12% to their questionnaire study.

The impact of item non-response bias was assessed using the missing value analysis (MVA) module in SPSS and following conventional guidelines for identifying missing data and applying appropriate remedies (Hair *et al.*, 2010). This resulted in 21 cases being discarded for missing for more

than 5% data. No noticeable missing data pattern was observed for the remaining 384 cases. Little's test of data missing completely at random (MCAR) was nonsignificant [$\chi^2_{df=14126} = 14364.25$, $p = .079$], indicating that there is no significant difference between the observed missing data pattern in the sample and a random pattern. At this stage, a further three cases were discarded for missing data on the non-metric control variables (i.e. gender, age, grade, nationality, ethnicity) in our study; two were missing data on all five control variables and the third, on nationality and ethnicity. The expectation-maximization data imputation method (cf. Hair *et al.*, 2010) was used to impute replacement values for missing metric data. The binary logistic regression procedure in SPSS was used to statistically test the odds that six demographic variables and three project characteristics were related to high-effort ($n = 123$) rather than low-effort (reference category; $n = 258$) respondents. The results showed that no systematic differences existed between low-effort and high-effort respondents: nonsignificant ratio test [$\chi^2(df = 10) = 8.301$, $p = .599$]; nonsignificant score test [$\chi^2(df = 10) = 7.873$, $p = .641$]; nonsignificant associations between individual predictors and high-effort respondents ($p > .05$); nonsignificant Hosmer and Lemeshow (H-L) goodness-of-fit test [$\chi^2(df = 8) = 3.105$, $p = .928$]. The presence of social desirability bias in the data was tested using Strahan and Gerbasi's (1972) 10-item short version of the 33-item Marlowe-Crowne Social Desirability scale (Crowne and Marlowe, 1960). Social desirability bias is bias that is associated with self-reported survey data, and exists because of a general human tendency to obey demand characteristics ('fake good') when self-reporting attitudes and behaviors (Mitchell and Jolley, 2001). All the Pearson's correlations ($N = 381$) were near zero (i.e., $r < |0.20|$) and statistically nonsignificant ($p > .05$), suggesting that the study constructs are not significantly tainted with social desirability bias (Mitchell and Jolley, 2001). The results of the data examination provide methodological and empirical reasons to believe that the analysis sample of 381 cases was not biased and is suitable for the subsequent analyses.

Study 2

The questionnaire responses analyzed in Study 2 were from 140 chartered built environment professional managers in Hong Kong. The average age of the participants was 44 years. The average total experience of the participants in construction was 20 years and average experience in current position was seven years. All participants held managerial positions in the projects on which they reported, and all but three of them had at least a bachelor's degree. The sample comprised 101 Chinese, 37 Caucasians and two participants of other ethnicities. The gender composition of the sample was 135 male and 5 female participants.

The survey instrument design, data collection and examination procedures were similar to those in Study 1, and have been described in detail elsewhere (Anvuur and Kumaraswamy, 2012; Anvuur *et al.*, 2012). Items were drawn from a larger Hong Kong questionnaire survey, data collection for which commenced in November 2006 and ended in March 2007. The questionnaire was sent out to 1100 potential respondents randomly drawn from a sampling frame for a study population defined using a purposive sampling procedure, as described earlier for Study 1. Out of this number 153 valid responses were received, representing a response rate of 18% or the higher rate of 20% when adjusted for the 'non-eligibles' in the sampling frame. This response rate compares reasonably well with those reported for similar Hong Kong studies (e.g. Phua, 2004).

Measures

Items measuring the four dimensions of individuals' cooperation with their workgroups (in-role, extra-role, compliance, and deference) were based on Anvuur and Kumaraswamy (2012) and were scored on a 5-point response format (1 = *never* to 5 = *very often*). *In-role* behaviour was measured using four items. A sample item reads 'I fulfill the responsibilities specified in my job description'.

358 *Extra-role* behaviour was assessed with four items, for example, 'I volunteer to do things that are not
359 required in order to help my workgroup'. *Compliance* behaviour was measured with three items. A
360 sample item reads 'I comply with work related rules and regulations'). *Deference* behaviour was
361 assessed with three items, for example, 'I willingly follow my project organization's policies'. See
362 Appendix (items 1—14) for scale items for the cooperation dimensions.
363 The teamwork climate dimensions (integrative interactions, authority support, common goals,
364 and equal status) were measured with 19 items (items 15—33, Appendix) each scored on a 5-point
365 response format (1 = *strongly disagree* to 5 = *strongly agree*). *Integrative interactions* implies frequent
366 interactions among workgroup members in joint decision-making and problem-solving, and was
367 measured using four items (items 15—18, Appendix) adapted from the 'interaction frequency'
368 subscale ($\alpha = 0.84$) of Anderson and West's (1998) Team Climate Inventory (TCI). A sample item reads
369 'We meet frequently to talk both formally and informally'. *Common goals* was measured with six items
370 (items 25—30, Appendix) adapted from the 11-item 'vision' subscale ($\alpha = 0.94$) of Anderson and
371 West's (1998) TCI. The TCI vision subscale reflects the extent of clarity, sharedness, attainability and
372 importance of workgroup objectives, and is consistent with the conceptualization of common goals in
373 the present study (e.g. 'I very much agree with my workgroup's objectives'). *Authority support* reflects
374 the extent of support of the authorities, procedures and norms for joint decision-making and problem
375 solving in the workgroup. This was measured with six items (items 19—24, Appendix) adapted from
376 Siegel and Kaemmerer's (1978) 'support for creativity' scale (split-half reliability = 0.94). A sample
377 item reads 'Our ability to function cooperatively is respected by the leadership'. *Equal status* in a
378 workgroup context implies mutual recognition, appreciation of and opportunities for individuals'
379 contributions to the workgroup effort. Equal status in a workgroup context implies mutual
380 recognition, appreciation of and opportunities for input. This facet was measured in Study 1 with

three items (items 31-33, Appendix: Study 1) adapted from Anderson and West's (1998) 8-item 'participative safety' subscale and in Study 2, with four items that assessed equal status (items 31-34, Appendix: Study 2) adapted from Tyler and Blader's (2001) 8-item 'respect for work' scale (e.g. 'Colleagues in my proximal workgroup value what I contribute at work').

Control variables. We included controls for the effects of ethnicity, age, gender and educational attainment in order to account for these possible alternative explanations for the cooperation of individuals with the TMO project workgroups. In both Studies 1 and 2, gender and education were dummy-coded to test the effects of being female (i.e. male = 0) and holding a postgraduate qualification (i.e. bachelor's and below = 0), respectively, on in-role, extra-role, compliance, and deference behavior. Ethnicity was dummy-coded to test the effects of being Caucasian (i.e. non-Caucasian = 0) in Study 1 and Chinese (i.e. non-Chinese = 0), while age was dummy-coded to test the effects of being older than 50 years (i.e. ≤50 years = 0) in Study 1, and older than 40 years (i.e. ≤40 years = 0) in Study 2.

Instructions preceding the questionnaire items in both Studies 1 and 2 (save the demographic and social preference items) oriented respondents to focus on their role *and* proximal cross-functional workgroup within *one* and *the same* construction project that they were recently involved in within 5 years of survey date. This is in keeping with the conceptualizations of the teamwork climate and cooperation constructs, and also increases the accuracy of the measures by ensuring that they are specific to a TMO workgroup and by minimizing the potential impact of recall bias.

Analysis procedure

The statistical procedure used was structural equation modeling (SEM), using AMOS software (Arbuckle, 2011). The two-step approach to SEM (Anderson and Gerbing, 1992) was adopted. First, confirmatory factor analysis (CFA) was performed to assess the fit to the data of the multidimensional

CFA model with the first-order latent constructs integrative interactions, authority support, common goals, and equal status loaded onto a superordinate latent construct (four-factor superordinate model). The fit to the data of our hypothesized four-factor superordinate model was compared with the fit to the data of competing and alternative models of teamwork climate: (1) a three-factor multidimensional model with the first-order latent constructs supported integrative interactions (combining the integrative interactions and authority support items), common goals, and equal status loaded on to a superordinate latent construct (three-factor superordinate model); (2) and a model with all the teamwork climate items loaded on to a single latent construct (one-factor model). All the models above also included the four dummy-coded control variables (ethnicity, age, gender, and education) and the four cooperation dimensions (in-role, extra-role, compliance, and deference). A scale was set for each first-order latent construct by fixing a path leading from the construct to unity and for each superordinate construct, by fixing its variance to unity, thereby standardizing it. The error variances for the dummy-coded variables were fixed to zero. Secondly, once a good-fitting CFA model was obtained, we proceeded to specify and test a structural model containing the hypothesized relations between the four-factor superordinate teamwork climate construct and each cooperation dimension.

As absolute values of univariate skewness and kurtosis for scale items were all below 2 and 7 respectively and the four dummy-coded control variables were fixed, maximum likelihood estimation was used (cf. Curran *et al.*, 1996). When assessing absolute model fit, evidence of satisfactory fit for a CFA model of this complexity would include a significant χ^2 value, a normed χ^2 (i.e. χ^2/df) value below 5, comparative fit index (CFI) and incremental fit index (IFI) values of 0.90 or higher, and root mean square error of approximation (RMSEA) value below 0.08 (cf. Hair *et al.*, 2010). The measurement models described above are all nested and, therefore, were compared with one another using Chi-

square difference tests. Good convergent validity is generally indicated by (Hair *et al.*, 2010): statistically significant factor loadings of 0.50 or higher; average variance extracted (AVE) estimates of 0.50 or higher; and construct reliability (CR; the conceptual equivalent to Cronbach's alpha) estimates of 0.70 or higher. Discriminant validity is demonstrated if the AVE estimate for each construct is greater than the squared interconstruct correlations associated with that construct (Hair *et al.*, 2010).

Results

Study 1

CFA

The analysis confirmed a good overall fit of the four-factor teamwork climate CFA model to the data: $\chi^2(df = 593) = 1132.83$, $p = .000$; $\chi^2/df = 1.91$; RMSEA = 0.049; IFI = 0.93; CFI = 0.93. This model was better fitting than a three-factor model with items measuring integrative interactions and authority support loaded onto a common factor ($\Delta\chi^2(1) = 546.304$, $p = .000$) and a one-factor model with all the teamwork climate items loaded onto a single factor ($\Delta\chi^2(4) = 1359.9$, $p = .000$). Both the one-factor and three-factor models did not fit the data well. (We also performed a Bollen-Stine bootstrap procedure with 5000 resamples to assess the overall CFA model fit to the data and obtained the same results as reported above for the normal theory test.) All standardized factor loadings ranged from 0.62 to 0.93, and all freely estimated loadings were statistically significant at $p = .000$. The factor loadings of the teamwork climate indicators were substantially high (integrative interactions, $\lambda = 0.80$; authority support, $\lambda = 0.72$; common goals, $\lambda = 0.69$; equal status, $\lambda = 0.81$). The CR estimates for all latent constructs, presented in Table 1, substantially exceeded the cut-off value of 0.70, suggesting adequate reliability. All AVE estimates in Table 1 (diagonal entries) exceeded the 0.50 threshold value. Thus, overall, the evidence supports the convergent validity of the CFA model. In Table 1 it is clear to

449 see that each AVE estimate is greater than the squared interconstruct correlations in the row or
450 column in which it is found. Therefore, the discriminant validity of the CFA model is confirmed.

451 The pattern of statistically significant, positive correlations among the latent constructs in
452 Table 1 ($r \geq 0.24$, $p < .001$), consistent with theoretical expectations, provides evidence of nomological
453 validity on a zero-order basis. Of the four control variables, ethnicity was significantly associated with
454 extra-role behavior ($r = 0.26$, $p < .001$) and age ($r = 0.18$, $p < .001$), age was also significantly related to
455 teamwork climate ($r = 0.20$, $p < .001$), while education was significantly associated with compliance ($r =$
456 0.11, $p < .001$) and gender ($r = 0.11$, $p < .001$).

457 ---

458 **Table 1** about here

459 ---

460 **SEM**

461 Having established that the CFA model has a good fit to the data, we proceeded to test the
462 structural model for corroboration (or otherwise) of hypotheses H_1 through to H_4. We also included
463 paths from each of the four control variables (ethnicity, age, gender, and education) to in-role, extra-
464 role, compliance, and deference behavior. The bias-corrected and accelerated bootstrap (BC_a)
465 procedure with 5,000 resamples was used to generate the 95% confidence intervals and associated
466 standard errors of parameter estimates. A parameter estimate is significant if its 95% bootstrap
467 confidence interval does not include zero (Cheung and Lau, 2008). The results showed convergence
468 between the normal theory sample estimates and the bootstrap estimates. The results also suggested a
469 good fit of the structural model to the data: $\chi^2(df = 599) = 1286.05$, $p = .000$; $\chi^2/df = 2.147$; IFI = 0.91; CFI =
470 0.91; RMSEA = 0.055. The structural model is shown in Fig. 2. To avoid visual clutter, the error terms

for factor loadings and disturbance terms for latent constructs, as well as all the objects, names and parameters associated with the four control variables (ethnicity, age, gender and education) are not displayed in Fig. 2. However, an error or disturbance term is easily computed as 1 minus the squared multiple correlation. For example, the error term for indicator number 1, $e_1 = 1 - 0.70 = 0.30$; and the disturbance term for the integrative interactions construct, $d_1 = 1 - 0.57 = 0.43$. All coefficients in Fig. 2, including path coefficients and freely estimated factor loadings are statistically significant at $p < .001$. The stability of parameter estimates between the CFA and SEM models (allowing for the expected insignificant factor loading fluctuations of $\leq |0.05|$) provides further evidence of discriminant validity.

The structural path from ethnicity to extra-role behavior (not shown in Fig. 2) was statistically significant and positive ($\beta = 0.23$; 95% CI = 0.11, 0.36; $p = .000$), suggesting that the Caucasian respondents in the sample engaged in more extra-role behavior than the non-Caucasians. No significant effects were found for the other control variables. Hypothesis H_1 predicted that teamwork climate would significantly and positively influence in-role behavior. The hypothesis was supported, as the structural path from teamwork climate to in-role behavior (see Fig. 2) was statistically significant and positive ($\beta = 0.47$; 95% CI = 0.34, 0.60; $p = .000$; $R^2 = 0.23$). The results in Fig. 2 also show that: teamwork climate is significantly and positively related to extra-role ($\beta = 0.49$; 95% CI = 0.35, 0.61; $p = .000$; $R^2 = 0.31$), compliance ($\beta = 0.57$; 95% CI = 0.43, 0.70; $p = .000$; $R^2 = 0.33$), and deference behavior ($\beta = 0.52$; 95% CI = 0.36, 0.66; $p = .000$; $R^2 = 0.27$). Therefore, hypotheses H_2, H_3 and H_4 were also supported.

…….

Fig. 2 about here

…….

493 We also performed supplemental analyses to assess the utility of our multidimensional
494 conceptualization of teamwork climate. The relationships between dimension specificities and the
495 effects of the superordinate teamwork climate construct were assessed as the incremental variances
496 explained by integrative interactions, authority support, common goals, and equal status after
497 controlling for the superordinate teamwork climate construct (cf. Edwards, 2001). These were tested
498 using modification indices (MIs) for parameters directly linking integrative interactions, authority
499 support, common goals, and equal status to each cooperation dimension; these MIs are each chi-
500 square distributed with $df = 1$, and indicate the expected improvement in model fit if a constrained
501 parameter is freed (Edwards, 2001). To control for Type I error, the recommendation by Edwards
502 (2001) to divide the nominal p-value of .05 by the number of MIs examined (i.e. 4 x 4 = 16 in the
503 present study) was followed, and this produced a critical p-value of .003125 and corresponding chi-
504 square of 8.733, for $df = 1$. The largest MI for all parameters directly linking integrative interactions,
505 authority support, common goals, and equal status to each cooperation dimension was 4.692; that is,
506 all MIs were below the critical chi-square value of 8.733. Therefore, the results show that after
507 controlling for the effect of the superordinate teamwork climate construct, there is no significant direct
508 effect of any of its dimensions on any cooperation dimension. Note that the foregoing omnibus test for
509 all dimension specificities also constitute a test of differences in criterion-related validity between the
510 multidimensional construct and its dimensions because "any increase in criterion-related validity for
511 the dimensions is attributable to aspects of the dimensions not shared with the construct" (Edwards,
512 2001:165). These results provide further support for our superordinate multidimensional
513 conceptualization of teamwork climate.

514 **Discussion**

The results of Study 1 provide specific support for the four hypotheses tested in this research and, more generally, support the application of the conceptual framework developed by Anvuur and Kumaraswamy (2007) to the problem of cooperation in construction projects. First, the results provide support for the construct validity of our superordinate multidimensional conceptualization of teamwork climate. Second, the results show that teamwork climate influences all four dimensions of an individual's cooperation with the workgroup. Third, the results of the additional analyses undertaken provide support for the substantive utility of the superordinate multidimensional teamwork climate construct in this study; they show that it is the shared variance in the teamwork climate dimensions, rather than their unique variances, that is instrumental in tapping into all facets of an individual's cooperative behavior. These findings are also very significant practically, in so far as they inform the ongoing debate about how best to improve the level of cooperation in and performance of projects the world over.

The results of Study 1, although fully consistent with our hypotheses, require corroboration. The sample for Study 1 consisted predominantly of middle-aged Caucasian males. It is possible that the results of Study 1 are biased by the sample or its UK context, although we included statistical controls for the effects of ethnicity, age, gender and highest educational attainment. It was therefore important to test the hypotheses for corroboration in a different sample and context to that in Study 1. Study 2 (discussed below) achieved just that, by testing the hypotheses for corroboration in a predominantly Chinese sample (N = 140) drawn from built environment professional managers in Hong Kong; given the smaller sample size, hence statistical power, Study 2 provides an even stricter test of the hypotheses in this research.

Study 2

CFA

The results show a satisfactory fit of the four-factor superordinate CFA model to the data: $\chi^2(df = 629) = 928.27$, $p = .000$; $\chi^2/df = 1.48$; RMSEA = 0.059; IFI = 0.91; CFI = 0.91. All standardized factor loadings ranged from 0.61 to 0.97, and all freely estimated loadings were statistically significant, $p = .000$. This model fit the data better than a three-factor model in which the items measuring integrative interactions and authority support were merged and loaded onto a common factor ($\Delta\chi^2(1) = 175.00$, $p = .000$) and a one-factor model with all the teamwork climate items loaded onto a single factor ($\Delta\chi^2(4) = 552.63$, $p = .000$). Neither the three-factor model nor the one-factor model fit the data well. The standardized loadings ranged from 0.61 to 0.97. The factor loadings for the superordinate teamwork climate construct were substantially high (integrative interactions, $\lambda = 0.76$; authority support, $\lambda = 0.88$; common goals, $\lambda = 0.75$; equal status, $\lambda = 0.75$). Table 2 shows the CRs, interconstruct correlations and AVE estimates for the variables in the CFA model. The CR estimates for all latent constructs were substantially higher than the threshold value of 0.70, thus suggesting adequate reliability. Except for extra-role, with an AVE estimate of 0.47, all AVE estimates in Table 2 exceeded the threshold value of 0.50. The below-threshold AVE estimate for extra-role is despite its substantially high CR estimate of 0.86. However, it is not uncommon for acceptably reliable latent constructs to have below-threshold AVE estimates (Hair *et al.*, 2010). Overall, however, the evidence supports the convergent validity of the CFA model.

The discriminant validity of the CFA model is demonstrated in Table 2 where it is clear to see that each AVE estimate is greater than the squared interconstruct correlations in the row and column in which it is found. The pattern of statistically significant, positive correlations among latent constructs in Table 2 ($r \geq 0.22$, $p < .05$), consistent with theoretical expectations, provides evidence of nomological validity on a zero-order basis. Of the four control variables, ethnicity was significantly associated with extra-role behaviour ($r = 0.19$, $p < .05$) and compliance ($r = 0.20$, $p < .05$), age was

561 significantly related to gender (r = –0.19, p < .05), and education was significantly associated with
562 compliance (r = 0.19, p < .05).

563 ---

564 **Table 2** about here

565 ---

566 **SEM**

567 Having established satisfactory fit of the CFA model to the data, we proceeded to test the
568 structural model for corroboration (or otherwise) of hypotheses H_1 through to H_4. The SEM model also
569 included paths from each of the four control variables (ethnicity, age, gender, and education) to in-
570 role, extra-role, compliance, and deference behavior. The results suggested a good fit of the SEM
571 model to the data: $\chi^2(df = 634) = 970.42$, p = .000; $\chi^2/df = 1.53$; IFI = 0.90; CFI = 0.90; RMSEA = 0.06. The
572 structural model is shown in Fig. 3. Numbers (1–34) are used to represent scale items for first-order
573 constructs in Fig. 3. All coefficients for the variables of interest in Fig. 3, including path coefficients
574 and freely estimated factor loadings were statistically significant at p < .05. The stability of parameter
575 estimates between the CFA and SEM models (allowing for the expected insignificant factor loading
576 fluctuations of ≤ |0.05|) provides further evidence of discriminant validity.

577 Except the statistically significant and positive effect of education on compliance behavior (β =
578 0.17, p = .037) (not shown in Fig. 3), no significant effect was found for the other control variables. We
579 found support for our substantive hypotheses. Hypothesis H_1 predicted that teamwork climate would
580 significantly and positively influence in-role behavior. This was supported, as the structural path from
581 teamwork climate to in-role behavior (see Fig. 3) was statistically significant and positive (β = 0.45, p =
582 .000; R^2 = 0.19). The results in Fig. 3 also show that: teamwork climate is significantly and positively

583 related to extra-role (β = 0.62, p = .000; R^2 = 0.37), compliance (β = 0.23, p = .015; R^2 = 0.13), and deference
584 behavior (β = 0.24, p = .019; R^2 = 0.11). Therefore, hypotheses H_2, H_3 and H_4 were also supported.

585 …….

586 **Fig. 3** about here

587 …….

588 We again performed supplemental analyses to test the substantive utility of our superordinate
589 multidimensional conceptualization of teamwork climate, using the same procedure as described
590 early for Study 1. We compared the largest MI for all parameters directly linking integrative
591 interactions, authority support, common goals, and equal status to each cooperation dimension the
592 critical p-value of .003125 and corresponding chi-square of 8.733, df = 1 (cf. Edwards, 2001). The largest
593 MI observed was 1.770, which below the critical chi-square value of 8.733; thus suggesting that, there
594 is no unique effect of integrative interactions, authority support, common goals, or equal status on any
595 dimension of individuals' cooperation. Also, the results show that the criterion-related validity of the
596 teamwork construct is not significantly different from that of its dimensions as a set. Again, these
597 results provide further support for our superordinate multidimensional conceptualization of
598 teamwork climate.

599 **Discussion**

600 The results of Study 2 corroborate those of Study 1, and support the four hypotheses examined
601 in this research. The results also provide support for the superordinate multidimensional
602 conceptualization of teamwork climate in this research. The results of Study 2, like those for Study 1,
603 show that teamwork climate influences all four types of cooperative: in-role, extra-role, compliance,
604 and deference behaviour. There is a marked difference, however, in the amount of unique variance in

605 compliance and deference explained by teamwork climate between Study 1 and Study 2: for
606 compliance, 32% (=.57^2 x 100) in Study 1 against 5% (=.23^2 x 100) in Study 2; and for deference, 27%
607 (=.52^2 x 100) in Study 1 against 6% (=.24^2 x 100) in Study 2. This may be because the superordinate
608 multidimensional teamwork climate construct has a smaller proportion of relevant variance shared
609 with the control variables in Study 1 than in Study 2.

610 The results of Study 2, like those of Study 1, demonstrate the convergent, discriminant, and
611 nomological validities of the superordinate multidimensional teamwork climate construct. Beyond
612 just demonstrating its construct validity, Study 2 indicates the substantive utility of the superordinate
613 multidimensional conceptualization of teamwork climate. The results of the supplemental analyses in
614 Study 2, like those of Study 1, show that after accounting for the effects of the superordinate
615 multidimensional teamwork climate construct, there is no unique, significant effect of any of its
616 dimensions on cooperative behavior. Thus, the results of Study 1 and Study 2, undertaken in different
617 contexts and with different sample sizes, are reinforcing in their support for the four hypotheses
618 examined in this research, and the construct validity and theoretical parsimony of the superordinate
619 multidimensional conceptualization of teamwork climate.

620 General Discussion

621 The two studies reported in this paper make an important contribution to research on how to
622 foster engagement in workgroups, and our collective understanding of the behavioral implications of
623 a teamwork climate in project contexts. They do so by showing that teamwork climate significantly
624 and positively influences all four dimensions of a role-incumbent's cooperation with the TMO
625 workgroup. These findings are consistent with the emphasis in Anvuur and Kumaraswamy's (2007)
626 conceptual model (see Fig. 1) on the formative role of a salient teamwork climate in TMO workgroup

627 contexts; the results provide sound empirical support for the model's proposition. The findings are
628 also consistent with those of previous research on the behavioral implications of work climates in
629 general (Richardson and Vandenberg, 2005; e.g. Walumbwa *et al.*, 2008; cf. Kuenzi and Schminke,
630 2009) and specifically, they extend previous CMR studies (e.g. Brookes *et al.*, 2006; cf. Anvuur and
631 Kumaraswamy, 2007; Tuuli and Rowlinson, 2009) that have connected aspects of the TMO workgroup
632 environment with members' cooperative behaviors.

633 The two studies reported in this paper further contribute to research on work climates by
634 demonstrating the value of a superordinate multidimensional conceptualization of teamwork climate.
635 They show that, after controlling for the superordinate multidimensional teamwork climate construct,
636 none of its four dimensions explains any incremental variance in an individual's cooperative behavior.
637 Thus, in contrast to the suggestion of previous research (e.g. West and Anderson, 1996; Anderson and
638 West, 1998; Pettigrew and Tropp, 2006), the present research demonstrates that a superordinate
639 multidimensional conceptualization of teamwork climate does not result in any loss of predictive
640 utility; in other words, our superordinate multidimensional conceptualization of teamwork climate
641 maximizes *predictive utility*, *parsimony*, and *bandwidth* (cf. Edwards, 2001). Also, these and other
642 findings discussed earlier on the criterion validity of the teamwork climate construct challenge
643 previous suggestions (see e.g. West and Anderson, 1996; Anderson and West, 1998; Pettigrew and
644 Tropp, 2006) about the primacy of authority support over the other three dimensions of this
645 superordinate multidimensional construct. Further, support for the superordinate multidimensional
646 conceptualization of teamwork climate in this research responds to the call for multiclimate or
647 hierarchical models of climate, as a response to the fragmentation in climate research caused by the
648 proliferation of facet-specific climates (Kuenzi and Schminke, 2009).

649 The use of the two samples from distinct cultural settings (Study 1, UK; and Study 2, Hong
650 Kong) and different measures for equal status represents a constructive replication, and provides the
651 strongest test of the hypotheses in this study (Lykken, 1968). That the findings from Studies 1 and 2
652 converge in providing full support for the multidimensional teamwork climate construct and its
653 hypothesized effects also provides evidence of their generalizability. The results for the control
654 variables (i.e. ethnicity, age, gender and education) in this research indicate significant effects only for
655 ethnicity in Study 1 and education in Study 2. They show that Caucasian respondents in Study 1,
656 compared to non-Caucasians, exhibited more extra-role behavior. Also, respondents with a post
657 bachelor qualification in Study 2, compared to those without one, exhibited more compliance
658 behavior. The results for the control variables may seem somewhat surprising. Indeed, on the basis of
659 previous research, the findings of no effect for rule-following (i.e. compliance, deference behavior) for
660 Chinese, when compared to non-Chinese respondents in the Study 2 sample (cf. Hofstede *et al.*, 2010),
661 and of a positive effect for extra-role for Caucasian, when compared non-Caucasian respondents in
662 the Study 1 sample (e.g. Moorman and Blakely, 1995) were unexpected. A plausible explanation for
663 the finding of no effect of being Chinese on rule-following behavior in Study 2 and for the significant
664 reduction in variance for rule-following behavior explained by the multidimensional teamwork
665 climate construct from Study 1 to Study 2 (i.e. average ΔR^2 from 30% to 6%) is that the
666 multidimensional teamwork climate construct (and its dimensions) overlaps with the fundamental
667 tenets of Chinese culture, such as collectivism and *guanxi* (e.g. Peng and Luo, 2000; cf. Hofstede *et al.*,
668 2010; Anvuur *et al.*, 2012). Future research may usefully verify the current findings for the control
669 variables in this research; however, the control variables *per se* are not of interest in this research,
670 although their inclusion allowed us to take account of these alternative explanations for respondents'
671 cooperative behaviors.

672 **Practical implications**

673 The findings of this research suggest that the presence and salience of a teamwork climate has
674 the capacity to unlock the full spectrum of individuals' cooperative behaviors in TMO workgroup
675 contexts. Thus, the findings have important practical implications for project managers trying to build
676 and sustain high-performance project teams. First, project managers must be heedful of the
677 development (or lack thereof) of common goals, equal status, integrative interactions, and authority
678 support in their TMO workgroups. Second, while progress in the development of any one of these
679 dimensions of climate may yield one or more of the associated positive outcomes (West and
680 Anderson, 1996; Pettigrew and Tropp, 2006; for a review of evidence in CMR, cf. Anvuur and
681 Kumaraswamy, 2007; e.g. Carson *et al.*, 2007), our findings show that it is the combined and balanced
682 pursuit of all four dimensions of climate, rather than one or another of them in isolation, that is key to
683 unlocking the full gamut of an individual's cooperative behavior in project settings. These insights are
684 critical, as they show that the development of a teamwork climate must be central to efforts to
685 improve the level of cooperation in projects; efforts that embody the partnering ethos (Anvuur and
686 Kumaraswamy, 2007).

687 Application of these insights, requires, consistent with the conceptual framework proposed by
688 Anvuur and Kumaraswamy (2007, see Figure 1), the deployment of targeted strategies—including
689 training, coaching and facilitation—for the development of the conditions and relevant cognitive cues
690 for the perception of common goals, equal status, integrative interactions, and authority support (i.e. a
691 teamwork climate). These insights and the conceptual model shown in Fig. 1, thus, provide a
692 framework for understanding the concept of partnering and for sensegiving in its practice;
693 sensegiving as used here refers to efforts to guide the "meaning construction of others toward a
694 preferred redefinition of an organizational reality" (cf. Gioia and Chittipeddi, 1991:442). For a

discussion on how the processes of enactment, sensegiving and sensemaking implicated in Fig. 1 can contribute to the much desired 'cultural transformation' of the construction sector as a whole, the reader is referred to Anvuur and Kumaraswamy (2007).

Limitations and future research

The usual limitations of any research of the kind reported in this paper apply; these limitations derive, principally, from the self-report nature of the data, sample demographics and location specificity of each study, and are best left to future research to address. However, the key concerns posed by these limitations may (i.e. effect size inflation, generalizability of findings) were mitigated in this study through the use of two cross-cultural samples, statistical controls, as well as the established procedural remedies for dealing with them (see "Method" section). Also, while our findings are consistent with our hypotheses, the extant literature and the causal directions depicted in our conceptual model, they do not prove causality. Therefore, corroboration of our findings by future research would be useful.

The focus in this research has been on psychological climate, that is, individuals' perceptions of their workgroup environment. While this has provided very useful insights, a useful extension to this research would be to test the same hypotheses at the workgroup level—that is, for collective perceptions of the work climate. Admittedly, surveying multiple respondents from different TMO workgroups will be very challenging but also might yield more insights beyond just corroborating the findings in the current research. Indeed, previous research has found different levels of the same outcomes for individual perceptions versus aggregated perceptions of climate phenomena (cf. Kuenzi and Schminke, 2009). Although our explanation above for the significant difference in variance for rule-following behavior explained by the teamwork climate construct between the predominantly Caucasian sample (95%) in Study 1 and the predominantly Chinese sample (72%) in Study 2 is entirely

718 plausible and founded in previous research, future research could usefully shed more light on the
719 precise role of culture in perceptions of teamwork climate. Nevertheless, the findings of the present
720 research provide important insights into how to foster the cooperation of individuals with their TMO
721 workgroups.

722 Conclusion

723 Anvuur and Kumaraswamy (2007) developed a conceptual model of partnering and alliancing
724 that placed emphasis on common goals, equal status, integrative interactions, and authority support
725 as being the optimal climate factors for effective teamwork in construction projects. Although the four
726 climate factors are well established in parallel lines of extant literature, they have not previously been
727 empirically tested simultaneously in the context of cross-functional TMO workgroups. Also, while
728 there is agreement in the extant literature that the four climate factors are interrelated, there is as yet
729 no consensus on precisely how they should be conceptualized: as distinct but related dimensions of a
730 single theoretical concept (i.e. multidimensional construct); or as distinct but related concepts (i.e.
731 multivariate set); this lack of consensus on the conceptualization of the teamwork climate factors is
732 against the backdrop of a broader debate in the extant literature about the utility of multidimensional
733 constructs relative to their dimensions.

734 In response, this research conceptualized the four climate factors as the dimensions of a
735 superordinate multidimensional latent construct, teamwork climate, and empirically tested the effects
736 of this multidimensional construct and its dimensions on individuals' cooperation with their TMO
737 workgroups in two field studies of built environment professional managers in the UK and Hong
738 Kong. The results of the two studies demonstrate the convergent, and discriminant validity of the
739 multidimensional teamwork climate construct, and show that teamwork climate significantly and

positively influences in-role, extra-role, compliance, and deference behaviour. Further, the results show that the common goals, equal status, integrative interactions, and authority support dimensions as a set neither explain any incremental variance in cooperative behavior nor possess any incremental criterion-related validity over and above the multidimensional teamwork work construct. These findings constitute significant contributions to knowledge in so far as they show that: (a) teamwork climate is a primary determinant of all dimensions of individuals' cooperative behavior in their TMO workgroups, hence provide strong support for the application in TMO settings of the conceptual model developed by Anvuur and Kumaraswamy (2007); (b) a superordinate multidimensional conceptualization of teamwork climate not only is viable, but also, at least in this research, maximizes predictive utility and provides theoretical parsimony and bandwidth; and (c) when considering managerial interventions to foster greater engagement in TMO workgroups, practicing project managers must focus attention on creating the generative project environments for the development, maintenance and perception of common goals, equal status, integrative interactions, and authority support.

Acknowledgements

Grant HKU7138/05E from the Hong Kong Research Grants Council supported data collection for Study 2. An earlier version of this paper, based on the Hong Kong sample only, was presented at the 19th CIB World Building Congress 2013 held in Brisbane, Australia.

References

Allport, G.W. (1954) *The nature of prejudice*. Cambridge, Mass: Addison-Wesley.

Anderson, J.C. and Gerbing, D.W. (1992) Assumptions and comparative strengths of the two-step approach: comment on Fornell and Yi. *Sociol. Methods. Res.*, 20(3), 321-333.

762 Anderson, N.R. and West, M.A. (1998) Measuring climate for work group innovation: development
763 and validation of the team climate inventory. *J. Organ. Behave.*, 19(3), 235-258.
764 Ankrah, N.A., Proverbs, D. and Debrah, Y. (2009) Factors influencing the culture of a construction
765 project organisation: an empirical investigation. *Eng. Const. Arch. Manage.*, 16(1), 26-47.
766 Anvuur, A.M. (2008) *Cooperation in construction projects: concept, antecedents and strategies*, Unpublished
767 PhD thesis, Department of Civil Engineering, The University of Hong Kong.
768 Anvuur, A.M. and Kumaraswamy, M.M. (2007) Conceptual model of partnering and alliancing. *J.*
769 *Constr. Eng. Manage.*, 133(3), 225-234.
770 Anvuur, A.M. and Kumaraswamy, M.M. (2012) Measurement and antecedents of cooperation in
771 construction. *J. Constr. Eng. Manage.*, 138(7), 797-810.
772 Anvuur, A.M., Kumaraswamy, M.M. and Fellows, R. (2012) Perceptions of status and TMO
773 workgroup cooperation: implications for project governance. *Constr. Manage. Econ.*, 30(9), 719-737.
774 Arbuckle, J.L. (2011) *Amos (Version 20)*. Chicago: IBM SPSS.
775 Brookes, N.J., Morton, S.C., Dainty, A.R.J. and Burns, N.D. (2006) Social processes, patterns and
776 practices and project knowledge management: A theoretical framework and an empirical
777 investigation. *Int. J. Proj. Manage.*, 24(6), 474-482.
778 Bryde, D.J. (2008) Is construction different? A comparison of perceptions of project management
779 performance and practices by business sector and project type. *Constr. Manage. Econ.*, 26(3), 315 -
780 327.
781 Carson, J.B., Tesluk, P.E. and Marrone, J.A. (2007) Shared leadership in teams: an investigation of
782 antecedent conditions and performance. *Acad. Manage. J.*, 50(5), 1217-1234.
783 Cheung, G.W. and Lau, R.S. (2008) Testing mediation and suppression effects of latent variables:
784 bootstrapping with structural equation models. *Organ. Res. Methods*, 11(2), 296-325.

785 Crowne, D.P. and Marlowe, D. (1960) A new scale for social desirability independent of
786 psychopathology. *J. Consult. Psychol.*, 24, 349-354.
787 Curran, P.J., West, S.G. and Finch, J.F. (1996) The robustness of test statistics to nonnormality and
788 specification error in confirmatory factor analysis. *Psychol. methods*, 1(1), 16-29.
789 Daspit, J., Tillman, C.J., Boyd, N.G. and McKee, V. (2013) Cross-functional team effectiveness: An
790 examination of internal team environment, shared leadership, and cohesion influences. *Team*
791 *Perform. Manage.*, 19(1), 34-56.
792 DeChurch, L.A. and Mesmer-Magnus, J.R. (2010) The cognitive underpinnings of effective teamwork:
793 a meta-analysis. *J. Appl. Psychol.*, 95(1), 32-53.
794 Dulaimi, M.F. and Langford, D. (1999) Job behaviour of construction project managers: determinants
795 and assessment. *J. Constr. Eng. Manage.*, 125(4), 256-264.
796 Edwards, J.R. (2001) Multidimensional constructs in organisational behaviour research: an integrative
797 analytical framework. *Organ. Res. Methods*, 4(2), 144-192.
798 Fellows, R. and Liu, A.M.M. (2013) Use and misuse of the concept of culture. *Constr. Manage. Econ.*,
799 31(5), 401-422.
800 Gaertner, S.L. and Dovidio, J.F. (2000) *Reducing intergroup bias: the common ingroup identity model*.
801 Philadelphia, PA: Psychology Press.
802 Gioia, D.A. and Chittipeddi, K. (1991) Sensemaking and sensegiving in strategic change initiation.
803 *Strateg. Manage. J.*, 12(6), 433-448.
804 Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010) *Multivariate data analysis: a global*
805 *perspective*. 7th ed. Upper Saddle River, NJ: Pearson/Prentice Hall.
806 Hobday, M. (1998) Product complexity, innovation and industrial organisation. *Research Policy*, 26(6),
807 689-710.

Hofstede, G., Hofstede, G.J. and Minkov, M. (2010) *Cultures and organizations: software of the mind*. 3rd Edition ed. New York, NY: McGraw-Hill USA.

Kuenzi, M. and Schminke, M. (2009) Assembling fragments into a lens: a review, critique, and proposed research agenda for the organizational work climate literature. *J. Manage.*, 35(3), 634-717.

Law, K.S., Wong, C.-S. and Mobley, W.H. (1998) Toward a taxonomy of multidimensional constructs. *Acad. Manage. Rev.*, 23(4), 741-755.

Lawrence, P.R. and Lorsch, J.W. (1967) *Organization and environment : managing differentiation and integration*. Boston: Division of Research, Graduate School of Business Administration, Harvard University.

Li, B., Akintoye, A., Edwards, P.J. and Hardcastle, C. (2005) Critical success factors for PPP/PFI projects in the UK construction industry. *Constr. Manage. Econ.*, 23(5), 459-471.

Liao, H. and Rupp, D.E. (2005) The impact of justice climate and justice orientation on work outcomes: a cross-level multifoci framework. *J Appl Psychol*, 90(2), 242-56.

Lindenberg, S. and Foss, N.J. (2011) Managing joint production motivation: The role of goal framing and governance mechanisms. *Acad. Manage. Rev.*, 36(3), 500-525.

Lykken, D.T. (1968) Statistical significance in psychology research. *Psychol. Bull.*, 70(3, Pt. 1), 151-159.

Mathisen, G.E., Torsheim, T. and Einarsen, S. (2006) The team-level model of climate for innovation: a two-level confirmatory factor analysis. *J. Occup. Organ. Psych.*, 79(1), 23-35.

Mathisen, G.E., Einarsen, S., Jorstad, K. and Bronnick, K.S. (2004) Climate for work group creativity and innovation: Norwegian validation of the team climate inventory (TCI). *Scand J Psychol*, 45(5), 383-92.

Mitchell, M.L. and Jolley, J.M. (2001) *Research design explained*. 4th ed. Fort Worth, TX: Harcourt College Publishers.

831 Mohammed, S., Ferzandi, L. and Hamilton, K. (2010) Metaphor no more: a 15-year review of the team
832 mental model construct. *J. Manage.*, 36(4), 876-910.
833 Moorman, R.H. and Blakely, G.L. (1995) Individualism-collectivism as an individual difference
834 predictor of organizational citizenship behavior. *J. Organiz. Behav.*, 16(2), 127-142.
835 Naumann, S.E. and Bennett, N. (2000) A case for procedural justice climate: development and test of a
836 multilevel model. *Acad. Manage. J.*, 43(5), 881-889.
837 Peng, M.W. and Luo, Y. (2000) Managerial ties and firm performance in a transition economy: the
838 nature of a micro-macro link. *Acad. Manage. J.*, 43(3), 486-501.
839 Pettigrew, T.F. (1998) Intergroup contact theory. *Annu. Rev. Psychol.*, 49, 65-85.
840 Pettigrew, T.F. and Tropp, L.R. (2006) A meta-analytic test of intergroup contact theory. *J. Pers. Soc.*
841 *Psychol.*, 90(5), 751-783.
842 Phua, F.T.T. (2004) The antecedents of co-operative behaviour among project team members: an
843 alternative perspective on an old issue. *Constr. Manage. Econ.*, 22(10), 1033-1045.
844 Richardson, H.A. and Vandenberg, R.J. (2005) Integrating managerial perceptions and
845 transformational leadership into a work-unit level model of employee involvement. *J. Organiz.*
846 *Behav.*, 26(5), 561-589.
847 Salas, E., Cooke, N.J. and Rosen, M.A. (2008) On teams, teamwork, and team performance: discoveries
848 and developments. *Hum. Factors*, 50(3), 540-547.
849 Schneider, B. and Reichers, A.E. (1983) On the etiology of climates. *Pers. Psychol.*, 36(1), 19-39.
850 Schneider, B., Ehrhart, M.G. and Macey, W.H. (2013) Organizational climate and culture. *Annu. Rev.*
851 *Psychol.*, 64(1), 361-388.
852 Siegel, S.M. and Kaemmerer, W.F. (1978) Measuring the perceived support for innovation in
853 organizations. *J. Appl. Psychol.*, 63(5), 553-562.

854 Strahan, R. and Gerbasi, K.C. (1972) Short, homogeneous versions of the Marlowe-Crowne social
855 desirability scale *J. Clin. Psychol.*, 28(2), 191-193.
856 Thamhain, H.J. (2004) Linkages of project environment to performance: lessons for team leadership.
857 *Int. J. Proj. Manage.*, 22(7), 533-544.
858 Tjosvold, D., Wedley, W.C. and Field, R.H.G. (1986) Constructive controversy, the Vroom-Yetton
859 model, and managerial decision- making. *J. Occup. Behav.*, 7(2), 125-138.
860 Tuuli, M.M. and Rowlinson, S. (2009) Empowerment in project teams: a multilevel examination of the
861 job performance implications. *Constr. Manage. Econ.*, 27(5), 473 - 498.
862 Tyler, T.R. and Blader, S.L. (2001) Identity and cooperative behaviour in groups. *Group Process Interg.*,
863 4(3), 207-226.
864 Walumbwa, F.O., Wu, C. and Orwa, B. (2008) Contingent reward transactional leadership, work
865 attitudes, and organizational citizenship behavior: The role of procedural justice climate
866 perceptions and strength. *Leadership Quart.*, 19(3), 251-265.
867 West, M.A. (1990) The social psychology of innovation in groups. *In:* West, M.A. and Farr, J.L. (Eds.),
868 *Innovation and creativity at work : psychological and organizational strategies*, pp. 4-36. Chichester,
869 England: Wiley.
870 West, M.A. and Anderson, N.R. (1996) Innovation in top management teams. *J. Appl. Psychol.*, 81(6),
871 680-693.
872 Worrall, L., Harris, K., Stewart, R., Thomas, A. and McDermott, P. (2010) Barriers to women in the UK
873 construction industry. *Eng. Const. Arch. Manage.*, 17(3), 268-281.
874

875 ## Appendix: Construct measures

Dependent variables

Note: Instructions preceding these measures guided respondents to answer the questions with regard to their proximal cross-functional workgroup in the referent project and their role within that workgroup. Items are numbers correspond with those in Figures 1 and 2.

In-role. How often have you (1 = 'never' to 5 = 'very often'): (1) fulfilled the responsibilities specified in your job description?; (2) performed the tasks that are expected as part of your job?; (3) met the performance expectations for your job role?; (4) adequately completed your required work tasks?

Extra-role. How often have you (1 = 'never' to 5 = 'very often'): (5) volunteered to do things that are not required in order to help your workgroup?; (6) made innovative suggestions to help improve your work setting?; (7) volunteered to help others when they have heavy workloads?; (8) lent a helping hand to others at work?

Compliance. How often have you (1 = 'never' to 5 = 'very often'): (9) complied with work-related rules and regulations?; (10) followed the policies established by your supervisor?; (11) carefully tried to carry out the instructions of your supervisor?

Deference. How often have you (1 = 'never' to 5 = 'very often'): (12) willingly followed your project organization's policies?; (13) done what your supervisor expected of you, even when not important?; (14) willingly accepted the decisions made by your supervisor?

Independent variables

Integrative interactions. To what extent do you agree or disagree with the following statements (1 = 'strongly disagree' to 5 = 'strongly agree'): (15) We keep in touch with each other as a workgroup; (16) We keep in regular contact with each other; (17) We meet frequently to talk both formally and informally; (18) We interact frequently.

Authority support. To what extent do you agree or disagree with the following statements (1 = 'strongly disagree' to 5 = 'strongly agree'): (19) Our ability to function cooperatively is respected by the leadership; (20) Cooperation is encouraged here; (21) Leadership in this workgroup can best be described as supportive; (22) Assistance in joint-working is readily available; (23) Members feel encouraged to express their opinions and ideas; (24) Leaders here encourage and support workgroup members' development

Common goals. To what extent do you agree or disagree with the following statements (1 = 'strongly disagree' to 5 = 'strongly agree'): (25) I am very clear about what my workgroup's objectives are; (26) I think that my workgroup's objectives are very useful and appropriate; (27) I very much agree with my workgroup's objectives; (28) I think that other workgroup members agree with these objectives; (29) I think that my workgroup's objectives are clearly understood by all; (30) I think that my workgroup's objectives can actually be achieved

Equal status. *Study 1* – To what extent do you agree or disagree with the following statements (1 = 'strongly disagree' to 5 = 'strongly agree'): (31) We have a "we are in it together" attitude; (32) People feel understood and accepted by each other; (33) Everyone's view is listened to even if it is in the minority. *Study 2* – To what extent do you agree or disagree (1 = 'strongly disagree' to 5 = 'strongly agree') that colleagues in your proximal workgroup: (31) respect the work you do; (32) respect your ideas; (33) value what you contribute at work; (34) value you as a member of your workgroup.

Table 1. Construct Reliabilities, Construct Correlations, and Variance Extracted Estimates for Study 1

Construct	CR	1	2	3	4	5	6	7	8	9
1. Compliance	0.92	0.69								
2. In-role	0.94	0.32[c]	0.62							
3. Extra-role	0.87	0.29[c]	0.47[c]	0.53						
4. Deference	0.83	0.73[c]	0.30[c]	0.24[c]	0.55					
5. Teamwork climate	0.92	0.47[c]	0.40[c]	0.45[c]	0.41[c]	0.57				
6. Ethnicity	1.00	0.04	0.02	0.26[c]	0.02	0.09	1.00			
7. Age	1.00	0.09	0.08	0.07	0.08	0.20[c]	0.18[c]	1.00		
8. Gender	1.00	0.06	–0.03	0.04	0.01	–0.03	–0.08	–0.09	1.00	
9. Education	1.00	0.11[a]	0.08	0.09	0.11	0.01	–0.08	–0.03	0.11[a]	1.00

Note. $N = 381$. CR, Construct Reliability. Entries below the diagonal are correlations among constructs. Diagonal entries are average variance extracted (AVE) estimates. Ethnicity. Age, gender and education were dummy-coded to test the effects of being Caucasian (Other ethnicity = 0), older (≤ 50 years = 0), female (male = 0), and postbachelor's qualification holder (bachelor's degree or below = 0).

[a] $p < 0.05$

[b] $p < 0.01$

[c] $p < 0.001$

Table 2

Table 2. Construct Reliabilities, Construct Correlations, and Variance Extracted Estimates for Study 2

Construct	CR	1	2	3	4	5	6	7	8	9
1. Compliance	0.95	0.72								
2. In-role	0.95	0.40[c]	0.67							
3. Extra-role	0.86	0.32[b]	0.61[c]	0.47						
4. Deference	0.89	0.67[c]	0.30[b]	0.33[b]	0.61					
5. Teamwork climate	0.94	0.22[a]	0.35[c]	0.52[c]	0.22[a]	0.62				
6. Ethnicity	1.00	0.20[a]	0.00	–0.06	0.19[a]	0.16	1.00			
7. Age	1.00	0.01	0.00	0.04	–0.05	0.09	–0.10	1.00		
8. Gender	1.00	0.05	–0.04	–0.07	0.04	0.02	0.03	–0.19[a]	1.00	
9. Education	1.00	0.19[a]	0.01	–0.01	0.15	0.07	0.01	0.04	0.02	1.00

Note. $N = 140$. CR, Construct Reliability. Entries below the diagonal are correlations among constructs. Diagonal entries are variance extracted (VE) estimates. Ethnicity. Age, gender and education were dummy-coded to test the effects of being Chinese (Other ethnicity = 0), older (≤ 40 years = 0), female (male = 0), and a postbachelor's qualification holder (bachelor's degree or below = 0).

[a] $p < 0.05$

[b] $p < 0.01$

[c] $p \leq 0.001$

Figure 1

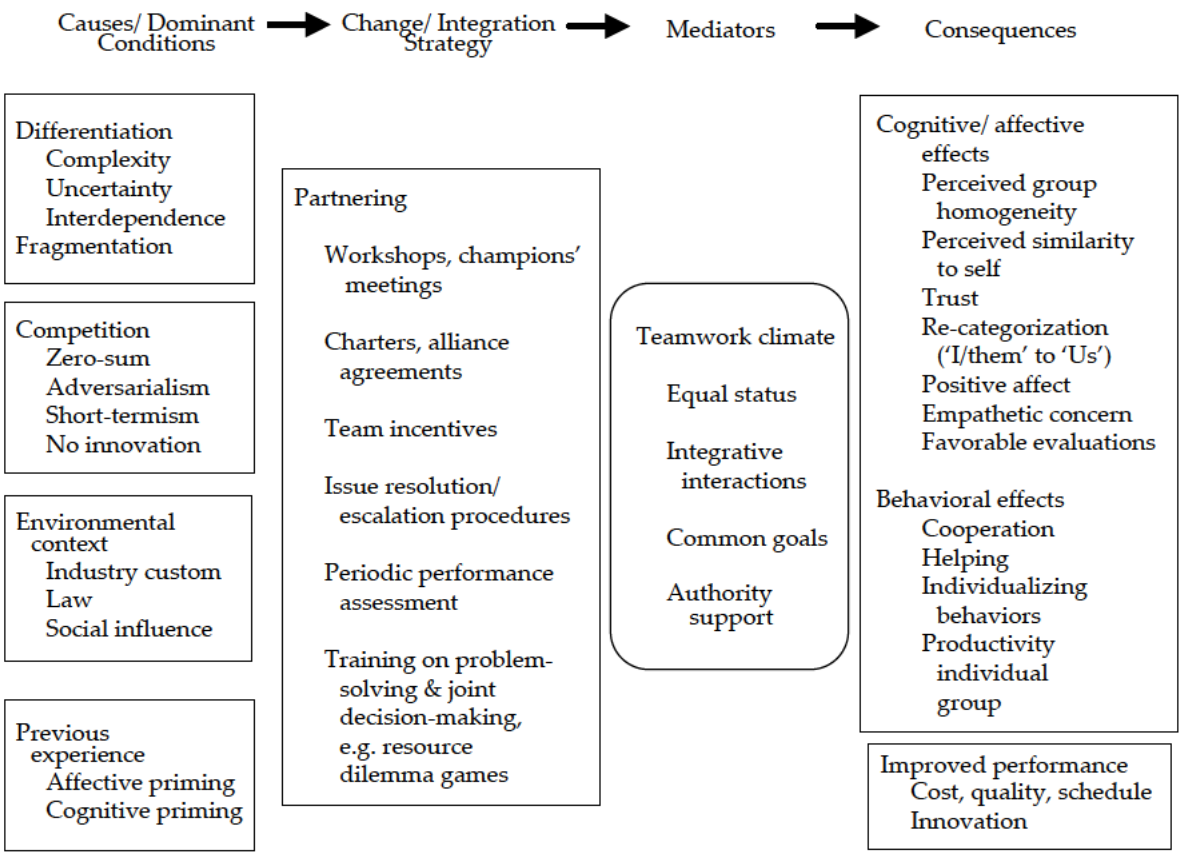
Causes/ Dominant Conditions
Change/ Integration Strategy
Mediators
Consequences
Differentiation
Complexity
Uncertainty
Interdependence
Fragmentation
Competition
Zero-sum
Adversarialism
Short-termism
No innovation
Environmental context
Industry custom
Law
Social influence
Previous experience
Affective priming
Cognitive priming
Partnering
Workshops, champions' meetings
Charters, alliance agreements
Team incentives
Issue resolution/ escalation procedures
Periodic performance assessment
Training on problem-solving & joint decision-making, e.g. resource dilemma games
Teamwork climate
Equal status
Integrative interactions
Common goals
Authority support
Cognitive/ affective effects
Perceived group homogeneity
Perceived similarity to self
Trust
Re-categorization ('I/them' to 'Us')
Positive affect
Empathetic concern
Favorable evaluations
Behavioral effects
Cooperation
Helping
Individualizing behaviors
Productivity individual group
Improved performance
Cost, quality, schedule
Innovation

Figure 2

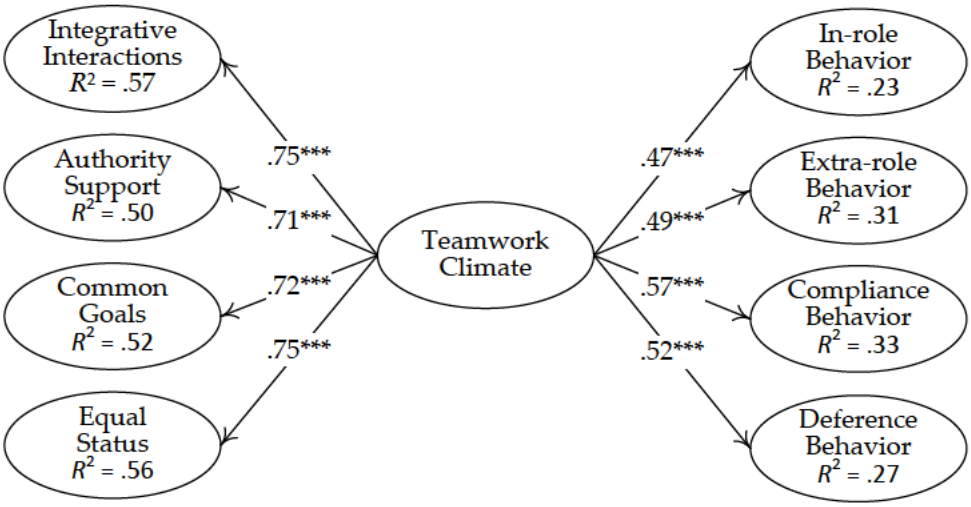
Integrative Interactions
R^2 = .57
Authority Support
R^2 = .50
Common Goals
R^2 = .52
Equal Status
R^2 = .56
.75***
.71***
.72***
.75***
Teamwork Climate
.47***
.49***
.57***
.52***
In-role Behavior
R^2 = .23
Extra-role Behavior
R^2 = .31
Compliance Behavior
R^2 = .33
Deference Behavior
R^2 = .27

Figure 3

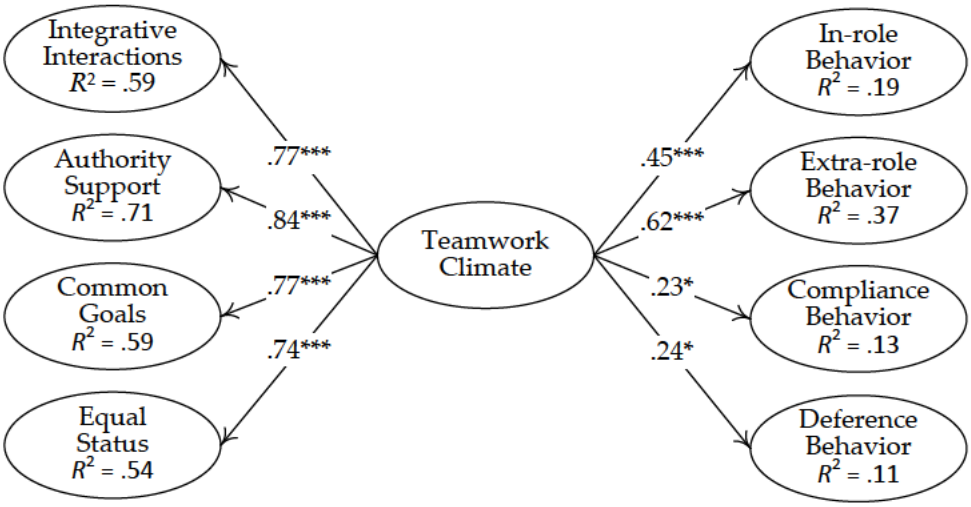
Integrative Interactions
R^2 = .59
Authority Support
R^2 = .71
Common Goals
R^2 = .59
Equal Status
R^2 = .54
.77***
.84***
.77***
.74***
Teamwork Climate
.45***
.62***
.23*
.24*
In-role Behavior
R^2 = .19
Extra-role Behavior
R^2 = .37
Compliance Behavior
R^2 = .13
Deference Behavior
R^2 = .11

Figure Captions

Fig. 1. Conceptual model of partnering

Fig. 2. Structural equation modeling results for Study 1

$\chi^2(df = 599, N = 381) = 1286.05$ and $\chi^2/df = 2.15$, $p = .000$; IFI = .91; CFI = .91; RMSEA = .06. Analyses included dummy-coded controls for the effects of ethnicity (Non-Caucasian = 0), age (≤ 50 years = 0), gender (male = 0) and educational attainment (≤ bachelor's degree = 0) on in-role, extra-role, compliance, and deference behavior. Only the effect of ethnicity on extra-role behavior was significant ($\beta = .23$, $p = .000$). *** $p < .000$

Fig. 3. Structural equation modeling results for Study 2

$\chi^2(df = 634, N = 140) = 970.42$ and $\chi^2/df = 1.53$, $p = .000$; IFI = .90; CFI = .90; RMSEA = .06. Analyses included dummy-coded controls for the effects of ethnicity (Non-Chinese = 0), age (≤ 40 years = 0), gender (male = 0) and education (≤ bachelor's degree = 0) on in-role, extra-role, compliance, and deference behavior. Only the effect of education on compliance behaviour was significant ($\beta = .17$, $p = .037$). *** $p < .000$; * $p < .05$